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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

**MAKE UP EXAMINATION - JULY 2024**

**Course Code :** CSE2010

**Course Name :** Operating System

**Program :** B.Tech. Computer Science and Engineering

**Date :** 18-JULY-2024

**Time :** 01:30PM to 04:30PM

# Max Marks : 100

**Weightage :** 50%

# Instructions:

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

**PART A**

**ANSWER ALL THE TEN QUESTIONS 10 X 2 = 20M**

1. In priority scheduling algorithm, CPU is allocated to the process with and priority is compared with

(CO2) [Knowledge]

1. Mention the two stages a source program passes through, after compilation and translation, before execution.
2. and are the two types of system programs
3. Each entry in a segment table has and
4. Process Synchronization should be used in order to avoid data

(CO1) [Knowledge] (CO1) [Knowledge] (CO4) [Knowledge]

(CO3) [Knowledge]

1. Fixed-size memory partitioning method eliminates fragmentation and variable-sized memory partitioning method eliminates fragmentation

(CO4) [Knowledge]

1. is the concept in which a page is copied into the main memory from the secondary memory according to the requirement/demand

(CO4) [Knowledge]

1. when a process needs any resource, it should make for that & after using, it should the resource.
2. User interacts with the computer system using
3. List any 2 pre-emptive scheduling algorithms

(CO3) [Knowledge] (CO1) [Knowledge] (CO2) [Knowledge]

**PART B**

**ANSWER ALL THE FIVE QUESTIONS 5 X 10 = 50M**

1. Consider a system with four processes P1, P2, P3, and P4, and two resources, R1, and R2, respectively. Each resource has two instances. Furthermore, P1 is allocated an instance of R2, and requests an instance of R1, P2 is allocated an instance of R1, and doesn’t need any other resource, P3 is allocated an instance of R1 and requires an instance of R2, P4 is allocated an instance of R2, and doesn’t need any other resource.
   1. Draw the resource allocation graph.
   2. Is there a cycle in the graph? If yes name it
   3. Is the system in deadlock? If yes, explain why. If not, give a possible sequence of executions after which every process completes

(CO2) [Comprehension]

1. Explain microkernel and layered- approach structures with neat diagrams. Also mention their similarities and dissimilarities.

(CO1) [Comprehension]

1. Explain how wait() and signal() atomic operations can be used to solve critical section problem.

(CO3) [Comprehension]

1. With an example and diagram, illustrate the concept of segmentation and how it uses segmentation table to convert 2-dimensional logical address into physical address

(CO5) [Comprehension]

1. Given page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 for a memory of 4 frames.

Compare the number of page faults for LRU and Optimal page replacement algorithm

(CO4) [Comprehension]

**PART C**

**ANSWER ALL THE TWO QUESTIONS 2 X 15 = 30M**

1. An operating system uses the banker’s algorithm for deadlock avoidance when managing the allocation of three resource types X, Y and Z to three processes P0, P1 and P2. The table given below presents the current system state. Here, the Allocation matrix shows the current number of resources of each type allocated to each process and the Max matrix shows the maximum number of resources of each type required by each process during its execution.

**Allocation Max**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **X** | **Y** | **Z** | **X** | **Y** | **Z** |
| **P0** | 0 | 0 | 1 | 8 | 4 | 3 |
| **P1** | 3 | 2 | 0 | 6 | 2 | 0 |
| **P2** | 2 | 1 | 1 | 3 | 3 | 3 |

There are 3 units of type X, 2 units of type Y and 2 units of type Z still available. The system is currently in safe state. Consider the following independent requests for additional resources in the current state-

REQ1: P0 requests 0 units of X, 0 units of Y and 2 units of Z REQ2: P1 requests 2 units of X, 0 units of Y and 0 units of Z

Solve and check which request can be granted and which cannot be.

(CO3) [Application]

1. Consider the following set of processes, assumed to have arrived at time 0. The IO devices are available as requested. Consider the CPU scheduling algorithms Shortest Remaining Time First (SRTF) and Round Robin (RR). Assume that the processes P1, P2, P3, P4, arrive at times 0, 1, 2, 3 (ms) with burst times 5, 2, 4, 1( ms) respectively If the context switch delay incurred is 0.5 ms for both SRTF and RR(ignore the first and last context switch), and the time quantum for RR is 1.5 ms, then for both SRTF and RR, find the following-
2. Gantt chart
3. difference between the average turnaround times and average waiting times (in ms)
4. completion time of P3
5. exact number of context switches between P2 to P1

(CO2) [Application]